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# Designing an Energy Management Program



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# Designing an Energy Management Program

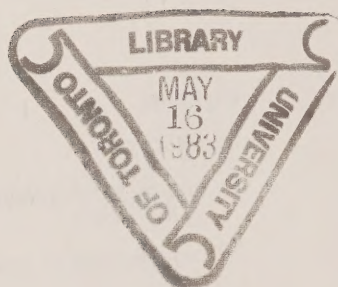
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For further information, contact your provincial department of energy or the Department of Energy, Mines and Resources, Ottawa.





# Designing A Municipal Energy Management Program

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## Introduction

With energy costs rising, good energy management can mean major dollar savings for municipal budgets. Buildings alone account for 35 to 55% of municipal energy use, and they can be the source of significant energy savings: up to 50% in heating and 30% in lighting systems alone. Motor fleet operations and street lighting are also major energy consumers, and where transit systems exist they are proving almost as energy-costly as buildings.

Fortunately, the potential for reducing energy consumption is also high in each of these areas. Appreciable reductions are possible with no capital outlay, and the full cost of investment in conservation measures can often be recovered rapidly through lower energy bills. In 1978, for instance, the City of Mississauga spent \$91,913 less on energy than they would have spent at 1977 consumption levels. And these savings were achieved with no capital expenditures whatsoever on conservation measures.\*

Taking full advantage of possible energy savings requires a carefully planned and well-coordinated energy management program. This section sets out the basic elements of such a program and draws on the experience of municipalities across the country to provide concrete examples wherever possible.

Broadly defined, municipal energy management involves the full range of municipal levers influencing community energy use. Energy sensitive development and transportation planning, public education programs and demonstration projects can be fruitful areas for municipal innovation. Waste heat recovery, conversion of solid waste to energy, recycling programs, solar demonstration projects and the like are possibilities worth exploring, while technical modifications to existing systems can result in important economies. Fuel substitution may be an issue, and whether or not current fuel sources are the most appropriate for the municipality's

needs. Finally, the possibility of future supply disruptions could be a long-term consideration in municipal energy management.

Because the scope for municipal action is so broad, this section concludes by discussing additional elements for a municipal energy strategy. The main focus, however, remains internal operations.

## 1 - Energy Conservation in Internal Operations

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Successful energy management programs share certain characteristics. Studies in both Canada and the United States reveal that the following factors have been particularly important in municipal conservation activities directed at internal operations:

- strong and visible support from elected officials and senior administrators
- strongly committed individual(s)
- clearly-defined objectives and targets
- designated responsibility for the program (usually an individual accountable to a committee or to management)
- a detailed data base on energy consumption
- effective internal communications

For officials planning municipal conservation activities these findings suggest some important considerations:

- a sound organizational framework
- a suitable system for recording and collecting data
- careful program planning
- a strategy for obtaining support
- a means of monitoring program activities in relation to established objectives
- effective internal communications

Actual details of conservation programs will vary from one municipality to another. Indeed it is essential that conservation activities be tailored carefully for each

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\* See Appendix - "Municipal Energy Conservation - Some Case Studies".



community. Nonetheless, when a program is being set up officials should give serious thought to each of these requirements.

## Organizing to conserve

An energy conservation program can affect every department in the municipality. The major energy consuming departments - police, public works, fire, roads and transportation - are obvious program participants since they account for a large proportion of total municipal energy use. Other departments (e.g. those responsible for planning, accounting and public relations) will also have a contribution to make, depending on the scope of the program.

With so many actors involved, a good organizational structure is essential to coordinate program activities. Experience is showing that the key to success is to make one individual explicitly responsible for conservation activities. This must be more than a titular role: the energy conservation officer must be someone with time to devote to conservation activities. And he should have authority within the municipal organization.

A committee structure also appears to be important. At present most of the effective internal energy management programs in Canada are run by conservation committees, often with a conservation officer.

Accountability is critical: the conservation officer, or the committee through its chairman, must report directly and regularly to Council, to a committee of Council, or to senior management.

Effective use can also be made of sub-committees or task forces to investigate specific measures or technologies (solid waste recovery, for example). Since municipal energy use is concentrated in buildings, transportation and street lighting, staff members with the necessary technical background can be asked to investigate potential savings in each area. Not only can such sub-committees identify measures to introduce immediately, they can also begin the research and analysis necessary for long-term program planning. If funds become available for capital expenditures, for example, this preliminary work may enable the committee to respond

quickly, assessing alternatives and judging which investments will be most profitable.

## Representation

If a committee structure is established, the question arises of whom to include. First, the major energy-consuming departments must be involved. Good representation from public works and maintenance departments is essential, and members from the departments of Finance and Purchasing can be particularly helpful with data collection and monitoring.

Representatives from local utilities can also be invited to sit on the committee, as permanent members or by invitation as required. Whatever the composition of the committee, it is important that department representatives have the authority to make decisions.

Committees which include operating and maintenance personnel on their roster have several advantages - in identifying specific and realistic targets, in producing ideas, and in selling the program to staff members who will be affected by the measures introduced. In smaller communities representation from Council is invaluable. Committee members who also sit on Council are effective spokesmen. As regular participants in Council deliberations, they will be sensitive to the energy implications of issues under discussion.

The committee's responsibilities also give some insight into how it should be composed. Basically, two types of coordinating activities will be carried out by the committee, technical and administrative.

### Technical Concerns:

- maintenance, adjustment, retrofit and replacement options in municipal operations
- revised operating guidelines, standards and procedures
- energy audits and data collection
- staying informed of current developments in energy conservation techniques
- evaluating suggestions

### Administrative Concerns:

- communicating energy conservation information to staff and to public

- providing energy consumption statistics
- receiving and responding to staff suggestions
- reporting to executive, making presentations, program proposals, and recommendations

Committee members must be selected to ensure that these concerns are adequately handled.

## Auditing municipal energy use

Understanding existing patterns of municipal energy use is the key to good program planning. Detailed information can be collected by carrying out a thorough energy audit of all municipal operations, identifying how much energy is used for each municipal function and at what cost.

In carrying out this audit, municipalities can benefit from growing experience across the country. Section 4 of this publication, "Auditing Municipal Energy Use", presents an audit method which has been tested in seven Canadian communities of varying sizes, and provides an insight into the process involved.

Data collected by the audit provides a baseline for measuring energy savings resulting from conservation activities. This audit information is also essential in assessing the cost-effectiveness of major capital investments. Over a period of time, anomalies in regularly collected consumption figures will also highlight areas of inefficient energy use, and thus pinpoint opportunities for energy savings.

Where the data can be compared, a detailed audit can also make it possible to identify areas of energy waste immediately (i.e. by comparing energy consumption per square foot of floor space.) To achieve maximum savings, outside assistance may be required to analyze thoroughly areas of high energy consumption. This will depend on the complexity of the operation and on skills available internally. Wherever possible, for instance, experienced consultants should carry out a professional audit of major municipal buildings. Such firms are able to identify areas of energy waste from computerized consumption data. Using this information, they can suggest immediate

steps to bring the buildings to their optimum energy efficiency.

Savings achieved by identifying the necessary changes immediately should repay the original investment quickly. Where outside help is engaged, however, it is important that the firm have the necessary ability and background to carry out a thorough energy analysis.

Like buildings, street lighting, vehicle fleet operations and transit are also major energy consumers. Energy use can be analyzed for each of these in turn to identify potential savings. The various sections of this publication discuss these opportunities in detail.

## Planning an effective program

One of the first steps, then, is to collect data through an audit of municipal operations and to single out easy-to-identify and immediate measures to reduce energy waste. A thoughtful appraisal of major municipal functions will suggest steps to take even while data is being collected for a more detailed analysis.

Changes to maintenance schedules, new operating guidelines, rescheduling equipment use and adjusting controls are only a few of many measures that can be introduced almost immediately. By making a thorough walk-through examination of municipal buildings, for instance, municipal staff can identify conservation measures that will result in immediate savings. Nor should the complexity of large buildings be a deterrent - large savings can result from simple and easily identified modifications. Municipal officials responsible for different municipal operations will be quick to spot areas of energy waste, whether due to mechanical problems or to improper maintenance and operating procedures.

In almost every case, Canadian municipalities begin their programs with just such obvious no-cost measures. As the Mississauga example proves, this alone can result in large savings.

Typically, the next phase involves small expenditures and more thorough modifications to operational and maintenance procedures. At this point the easy savings have usually



been realized, with buildings and equipment at or approaching their designed operating efficiency.

Yet another step is taken when the municipality begins to weigh major capital expenditures, offering large potential savings but requiring much longer cost-recovery periods. Predictably, as costs go up so does the complexity of the measures being considered.

Phasing in conservation activities has many advantages - not least is the credibility the program gains as major savings are achieved with little or no investment by the municipality. Success makes both management and staff more positive in their attitudes, and lends support to later proposals for more complex and costly measures. At the same time, the committee itself becomes better informed and more effective as it gains experience and as an information bank develops on local energy use.

Initially many measures will be self-evident. Preliminary staff discussions, research and municipal experience elsewhere will suggest early program activities. And the results of the municipal energy audit, backed by detailed analyses of buildings, street lighting and fleet performance, will identify specific targets and provide a basis for program planning.

Yet it is also important to consider what savings are actually achievable through various activities. The most obvious measures may not be the most effective, time-wise or cost-wise if expenditures are involved. Generally speaking, initiatives promising the greatest savings should be introduced first. A financial analysis of investment alternatives, using methods like those discussed in Section 5, will help to rank priorities. As a rule of thumb, the sooner the investment is recovered in cash savings, and the more significant those savings, the more priority it should be given.

Some municipalities fix a maximum "pay-back" period - usually three to five years - for the projects they are considering. They then use this maximum as a critical factor in deciding whether to proceed with or to postpone major initiatives. Pay-back analysis, however, is more complex than it might first appear, and the section on financial analysis should be examined before this calculation is applied. Also, because energy costs are increasing, these calculations should be reworked each year.

The action plan which is finally put together will provide a formal structure for the new energy conservation program. To be useful it should serve certain specific functions:

- o set out specific program goals
- o establish short, medium and long-term priorities
- o identify objectives and responsible personnel, assigning and scheduling specific tasks
- o provide a basis for evaluating progress
- o provide visibility and concrete form to the program

This action plan should include an estimate or target for overall energy savings. However, program objectives in each energy saving area should be as specific as possible. For instance, City Council may set a goal of 10% reduction in municipal energy use over the period of one year. An analysis of present conditions may suggest a specific objective, to reduce energy use for lighting by 20% in that time. Rather than simply stating the targeted 20%, the following is much more useful:

Objective - reduce lighting use in City Hall by 20% through a planned reduction of 30% of lighting elements and removal of ballasts in hallways, and installation of timers to automatically control lighting during unoccupied hours.

Such an objective locates and specifies the action to be taken, alerts those affected to the coming changes, and makes clear why those changes are being introduced.

Although it is a good idea to mention long-term activities, the action plan itself should be limited to one year in length, divided between activities which should begin immediately and those which will be implemented over the course of the year. A set schedule, identifying when each activity should be introduced, will help to keep the program on track.

Experience has shown that a short time frame, fixed goals and good scheduling keep the program from lagging, maintain staff commitment and make it easier to secure support and resources for the program.

One way to set out the action plan clearly is to chart planned activities, providing descriptions of each measure, the location, the responsible personnel and expected results.



## Action Plan Report

Item	Location	Activity	Timing	Responsibility	Energy Savings	Remarks
Fenestration (Windows/Doors)	Public Works Garage & Offices	<ul style="list-style-type: none"> <li>Add storm windows or change to insulating glass.</li> <li>Add weather stripping or seal windows.</li> <li>As a temporary measure to conserve energy, the windows or unused doors may be closed off with plywood and insulation.</li> <li>Add door closers.</li> </ul>	1-3 weeks (start May 1)	<ul style="list-style-type: none"> <li>Plant maintenance</li> <li>Outside contractor</li> </ul>	Heat loss can be reduced by 1/3 or more	<ul style="list-style-type: none"> <li>Insulating glass and storm windows increases the surface temperature of the glass, which improves comfort without raising the air temperature</li> </ul>
Domestic Hot Water	City Hall	<ul style="list-style-type: none"> <li>Repair leaks at hot water taps</li> <li>Check to see that hot water taps are shut off when not in use</li> <li>Repair leaks in hot water lines</li> <li>Reduce hot water thermostat setting to 105°</li> <li>Separate system from space heating or other hot water system</li> <li>Clean heaters regularly following the manufacturer's recommendations</li> <li>Water system should be flushed and cleaned periodically</li> </ul>	2-4 weeks (start May 7)	<ul style="list-style-type: none"> <li>Plant maintenance</li> <li>Plant employees</li> </ul>	Reducing temperature a moderate amount yields savings roughly proportional to change in temperature rise - assuming incoming water at 50°F, lowering hot water temperatures from 150°F (100° rise) to 105°F (90° rise) will save about 40%	
Burners	Community Centre	<ul style="list-style-type: none"> <li>Clean thoroughly</li> <li>Perform periodic combustion analysis and adjust burners</li> <li>Maintain, repair or replace inefficient burners</li> </ul>	Approximately 3 hours for combination check per furnace (May 15)	<ul style="list-style-type: none"> <li>Plant maintenance</li> <li>Superintendent</li> <li>Combustion specialist</li> <li>Burner manufacturer</li> </ul>	5-30% depending on current practice	<ul style="list-style-type: none"> <li>Presence of CO in flue gas indicates incomplete combustion - O<sub>2</sub> should be below 2%</li> </ul>
Unit Heaters Direct Fired	Works Garage	<ul style="list-style-type: none"> <li>Readjust burners for maximum efficiency</li> <li>Clean heat exchange surfaces</li> <li>Cycle fan operation</li> </ul>	Immediately	<ul style="list-style-type: none"> <li>Combustion specialist</li> <li>Plant engineer</li> </ul>	Improper combustion may be wasting 10% or more of the fuel	

Source: Adapted from Energy Conservation Handbook for Light Industrial and Commercial Buildings, Office of Energy Programs, U.S. Department of Commerce, May, 1974

# Building support for conservation

Building support for the conservation program will be a sound investment. Why is this groundwork necessary? Senior managerial and political support provides backup which will be critical to the success of conservation efforts. In a number of cases, committee spokesmen have attributed staff acceptance of lowered temperature and illumination levels directly to strong and visible management commitment to conservation activities. When the community is affected (e.g. by reduced garbage collection) such commitment is essential. Without it the committee, no matter how hard-working, risks being ineffectual.

When the support is there, necessary decisions and resources are more readily available. Clear indication that conservation is an important priority also results in greater commitment and enthusiasm among operational staff - something particularly important when the program gets underway.

Both council members and staff may have reservations about the program. At the elected and managerial level, it is important to know where support can be expected, and if there are objections to the program or to specific activities. Typically, such objections centre on doubt about the returns to the municipality from its investment of time and resources.

Operational and support staff may in their turn be indifferent, or resentful of additional duties, changes in routine, and a feeling of inconvenience resulting from some measures. In all cases, it is important to identify these reservations and to satisfy specific concerns.

Energy conservation is a positive response to changing circumstances, and means very real benefits to the community. Providing specific information on the need for conservation and the consequences of not conserving will give credibility to conservation efforts, as will descriptions of successful programs and dollar savings elsewhere. Involving staff in program development and keeping them well informed will also help to avoid problems.

One municipality, Halifax, launched its program with a 4-day series of seminars. Sessions were held for Council members, department heads, foremen, supervisors and staff.

Presentations summarized energy price and supply prospects and the benefits possible from conservation, highlighting municipal conservation activities elsewhere in Canada.

Tentative plans for the Halifax program were introduced, and small groups then discussed the proposals, identifying problems already experienced in individual attempts to reduce consumption. An overhead projector provided visual support for the presentations and handouts were distributed, including a maintenance checklist developed locally.

Subsequent staff response to the program has been excellent.

## Promotion and publicity

One of the underpinnings of a successful program is the support and cooperation of municipal employees. To win and keep this support, effective publicity and good information channels are extremely important.

There are three aspects to communications activities:

- o launching the new program
- o keeping staff informed of new program directions and program achievements
- o encouraging careful individual user habits and gradual changes in attitude

At the onset, official endorsement or some visible statement of senior level support must launch the program. Such an endorsement can take various forms: Council approval of a proposed program, adoption of an official energy conservation policy, creation of a committee, a formal Council resolution, or an amendment to the Official Plan of the municipality.



## Publicizing energy conservation

- Make the energy conservation program highly visible by placing stickers on machines and posters on plant walls.
- Put a rack of pamphlets in the lunch room or lobby.
- Use tent cards on cafeteria tables, reception areas and on office desks.
- Put signs and posters around the plant or office.
- Make progress charts showing targets and achievements.
- Put signs or stickers over taps and lights.
- Use photographs on bulletin boards showing problem areas.
- Write feature items for the company "house organ".
- Circulate letters and memos from the company's top executive and the program co-ordinator.
- Hold contests - logo contests, slogan contests or contests between departments or divisions of a plant.
- Set up a suggestion box for energy conservation ideas, with an award program.
- Use incentives to encourage energy conservation.

## Employee education

- Distribute books on energy conservation to employees.
- Send selected employees to seminars on energy conservation.
- Set up energy conservation training programs for department heads or include energy conservation in existing training programs.

Whatever means are used, this official endorsement should receive the broadest possible distribution, with copies going to each employee. Council may also consider a

public statement through local media. The City of Mississauga chose this approach, publicizing its program target of a 10% overall reduction in energy use over one year and following up with press releases when their goal was accomplished.

Such an endorsement is very effective. It makes clear to internal staff that energy conservation is a municipal priority, and it lends credibility to the energy conservation committee in carrying out its program. When proclaimed publicly a conservation program also benefits from the pressure on the municipality to live up to its commitments.

Once the program is launched, good internal communication between conservation officials and affected staff is also essential. Maintaining close touch with employees will improve chances for a smooth acceptance of energy-conserving measures, and with sensitivity to potential problems the committee can anticipate and overcome possible objections. Lowered temperature and illumination levels, for instance, may trigger an initially negative reaction from staff. By explaining the measures at the outset, the committee can avoid resistance and go a long way to enlisting cooperation.

Good communication, however, means more than simply avoiding problems. As a positive force it fills an important role - it keeps people informed, acknowledges outstanding achievements, and prompts suggestions and ideas from staff members.

If used well, communications tools can stimulate and maintain enthusiasm for the program, create a competitive spirit, and encourage individuals to use energy more responsibly both at work and in their own homes. A wide range of communications tools are available to the municipality, and some of the more common are listed on the following page.

## Program monitoring

Once the program is well underway, conservation officials must have a clear picture of its progress while remaining sensitive to any problems which might be developing. Three kinds of monitoring are involved:

- regularly recording the level of energy use and costs
- ensuring that targeted activities have been carried out on schedule

- keeping in touch with employee reaction to the program and to new routines

Properly used, an energy monitoring system will identify the program's achievements, suggest targets for new activities, and show where measures have not produced the desired results.

The municipal energy audit can provide an excellent data base for monitoring energy use, which can be done on a monthly, quarterly or yearly basis. By identifying energy consumption levels for a baseline year (i.e., the year before the program was introduced) the city can accurately measure subsequent savings due to conservation activities.

To prove the value of the program to management and to sustain a sense of progress and accomplishment among staff members this indicator is essential. In Mississauga effective monitoring has been vital on both counts. Other communities have cited problems with their monitoring system as a serious barrier to their conservation activities.

Monitoring program activity against the action plan provides a complementary measure of achievement - carrying out the assigned modifications and adjustments on schedule means significant progress in itself. And because progress is being monitored, there is pressure to meet deadlines and maintain activity levels. Additionally, this regular feedback is necessary to the conservation officials for overall program coordination.

The third focus of program monitoring, staff reaction, is difficult but important in assessing which measures are most popular and most successful, particularly in promotional activities. It will serve as an early warning system. The committee must also know if new energy conserving routines are actually being used (e.g. if lights are being turned off and if modified operating procedures are being followed.)

Spot checks can be useful. Someone on each floor, for instance, could be asked to ensure that all lights are turned off at closing and that thermostats are set back. Supervisors can be briefed on the measures being introduced, so that changes to operating procedures become part of the normal routine of the branch. Where certain departments or floors are not involved, special promotional efforts can be directed

to that area explaining the reasons for the program and the value of the new measures being introduced. Posters and "point of use" stickers can also be helpful.

Where spot checks are used, it is essential to avoid any impression that employees are under surveillance. Problems often reflect a breakdown in communications and are best treated with common sense and sensitivity to the source of the problem.

### Motivating through measurement

- Conduct an energy use survey, department by department, at the beginning of the program and at intervals thereafter.
- Conduct some audits at night or on weekends since some inefficiencies can best be seen at these times.
- Make an employee-occasion out of a visit by an Energy Bus or other energy audit service.
- Start by aiming the program at one specific service - whichever offers the most significant potential improvement.
- Make use of programs which will postpone the need for new facilities or services.
- Set both long-range and short-term goals.
- Set goals in familiar units that all workers will recognize.
- Make regular reports on each department's performance.
- Use the rivalry incentive - reports on the performance of other divisions or plants within the same company can create healthy competition.
- Assign one employee to energy conservation maintenance and energy audit recording.
- Install measuring devices to provide employees with a solid indication of their progress and give them an incentive to work harder.
- Publicize results.



## COMMUNICATION TOOLS

### HOW TO USE THEM

### BENEFITS

- |                                       |  |   |
|---------------------------------------|--|---|
| o official policy statement           | o publish in newsletter or by memo to each employee, make public policy announcement through local media   | o focus for launching program<br>o emphasizes that conservation is a municipal priority<br>o lends credibility to energy conservation officer/committee<br>o indicates senior level support for conservation measures   |
| o seminars, workshops                 | o for operational, clerical and administrative staff<br>o provide for discussion, ideas  | o opportunity to discuss need for conservation, benefits to town, details of programs, individual role  |
| o bulletin, newsletters, memos, etc.  | o include information regularly in in-house publication, if any<br>o <u>or</u> monthly bulletin<br>o <u>or</u> memo from conservation coordinator or committee | o publicizes goals and targets, measures introduced, achievements<br>o provides forewarning and explains reasons for various measures, particularly unpopular innovations (low temperatures) and those increasing staff workloads (audits)<br>o highlights outstanding individual or group effort |
| o charts                              | o should be simple to update<br>o display prominently  | o updated monthly, highlights progress and regressions in each building/department  |
| o "point of use" stickers, signs      | o post near lights, taps, thermostats  | o immediate reminder to individuals<br>o encourages careful energy use by individuals   |
| o poster, tent cards, stickers        |  | o general publicity and reminder of program and energy concerns   |
| o distribution of pamphlets *         | o situate in well-travelled areas, public reception areas  | o provides energy conservation materials to individuals   |
| o suggestion contest or award program | o for municipal employees (and for community)<br>o cash or other awards, fixed or varying according to the value of the suggestion                             | o encourages involvement and participation<br>o provides valuable source of ideas   |
| o committee representatives           |  | o can explain measures to staff, convey their concerns to committee, act as channel to ensure good communications   |

\* Available from ENER\$AVE, EMR, 588 Booth Street, Ottawa, Ontario K1A 0E4

## Monitoring Energy Use in Mississauga

In 1979 Council assigned a 10% target reduction in municipal energy consumption in the coming year. Mississauga's new conservation committee took immediate steps to ensure that their energy savings could be measured. The 1977/78 consumption data was compiled by the Purchasing Department for all city buildings, broken down for electricity, gas, oil and water in dollars and units (converted to a common unit, kwh).

All subsequent energy consumption has been measured against the 1977/78 yearly average for each building. This information is collected on a continuing basis, compared with the base figures and sent in quarterly reports to each Department Head and to the City Manager. The cost effectiveness of reduced energy consumption is also calculated based on current rates.

In a program where each Department Head is responsible for conservation activities within his own department, the monitoring system provides a strong incentive and cohesion to the municipality's conservation activities. According to Mississauga's conservation coordinator, successful monitoring is one of two essential factors in the success of their program (the second is the committee structure). Record forms developed by the municipality are particularly effective, and the system is working so well it is considered a model of its kind.

In addition to buildings, motor fleet operations are monitored by the Works Department Service Centre with a computer program recording performance and operating costs in miles and costs per gallon.

What are the major problems? Like other communities, Mississauga has had to work with inadequate records, duplication and estimated, rather than actual, consumption in billings. Currently they are developing new accounting procedures.

A second problem arises when there is a radical change in energy use in any one facility (i.e., installation of a swimming pool). It is essential that any adjustment to the base figure for that facility be carefully assessed by someone impartial, and procedures be worked out to arrive at fair and acceptable new base figures when it becomes necessary.

## 2 - Taking the Extra Step

Up to this point, this section has set out the basic building blocks of an internal energy management program. Municipalities can also have an important influence in other areas, however. As key actors in the planning process they are today shaping the form and structure of the settlements of the future - and of our future energy use patterns. And as leaders in community affairs they can play an important role in influencing public attitudes to conservation.

Because the scope for program activity is so wide, this section closes by touching briefly on possibilities for a broader energy conservation strategy, drawing on a range of activities underway in municipalities across the country.

### Land use planning

In growing communities, municipal planning decisions and development controls can have an important influence on future energy consumption. Where growth is static, infill and rezoning offer possibilities for developing a more energy efficient urban form. Key municipal land use planning tools can include the official plan, zoning by-laws, subdivision plans and agreements, standards for large scale projects, and transportation planning.

The brief case study of Brampton's new energy policies demonstrates how one community approached energy conservation in planning. It also demonstrates some of the questions and trade-offs planners are beginning to address (e.g. between assured sun rights and higher densities, or between solar gain, topography and wind accommodation.\*)

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\* Source: "Lang, Reg and Armour, Audrey. Energy Conservation and the Municipal Planner. Ottawa: Department of Energy, Mines and Resources, 1980.



## Case Study: Energy Policies in the Brampton Official Plan

Energy-conserving housing has become the new focus of Brampton planning and development policy. Energy policies in the Draft Official Plan include reference to reduced energy use in municipal operations, greater local self-reliance through diversification of services and work opportunities, mixed-use development, waste recycling, site orientation, landscaping, assured access to sunlight and greater use of public transit.

A planned solar subdivision just north of the city centre will be the first major application of the new policies. Changes being made to conventional subdivision design are expected to result in an average 10% saving in energy costs for the homeowner. As for the developer, the only extra costs incurred arise from landscaping.

The most important changes include:

- aligning streets east-west so that all lots face south;
- designing each unit so that main rooms are located on the south side of the house;
- restricting building height so that house shadow falls on empty space and not on another unit's south wall;
- where necessary, extending the roof overhang to shield south-facing windows from the sun in the summer while allowing full exposure in the winter; and
- slanting roofs at an angle providing maximum efficiency for future installation of solar panels.

Developments in energy efficient construction techniques and in site planning, for instance, are being watched closely by municipalities interested in application of these principles, not only in municipal buildings but also within their community.

Wood stoves have proven sound investments in some communities, particularly in the Maritimes.

District heating, heat reclamation and waste recovery systems are receiving increasing attention. And although still rare, a few municipalities have also taken the first step with active solar systems.

## Case Study: Heating with Solar - Richmond Hill's Outdoor Pool

At present, pool heating is considered one of the most cost effective uses of active solar technology. When Richmond Hill Town Council decided to purchase a new heater for its outdoor pool, they also explored the possibility of using a solar system.

A cost-shared agreement with the province funded purchase and installation of the solar panels, which cost a total of \$12,600. In addition, Council purchased a solar blanket for \$1,200. Operating efficiency of the system is estimated at over 50% during the summer.

With the success of this project in mind Council is now considering a solar hot water system for showers and washrooms in a new park development scheme.

## Appropriate technologies and building design

Both technical knowledge and actual experience are growing in the field of appropriate technologies, including the whole area of building design.

## Community involvement

Are community groups in the municipality active and interested in municipal affairs generally? Are any civic groups currently involved in conservation activities - carpools? recycling? information programs? Can the municipality complement these activities? What types of municipal conservation projects could benefit from public participation?

response to a questionnaire survey of 20 Canadian municipalities with a population greater than 240,000 (1986 census), November 1979.

● Measure adopted      ⊗ Measure under consideration      ○ Measure not being used

[illegible]

Energy management program, existing bldgs.	
Retrofit existing buildings	
Alter indoor temperatures	
Conservation techniques in new buildings	
Solar technology in new buildings	
Energy-efficient vehicles	
Increased maintenance program	
Rerouting (e.g. garbage trucks)	
Energy-efficient traffic controls	
Energy-efficient street lights	
Reduced illumination	
More attractive public transit	
Special lanes for buses, car pools	
Improved bicycling facilities	
Improved pedestrian facilities	



### COMMUNITY-DIRECTED MEASURES: Plans and Policies

City-wide studies of energy use	
Energy consideration in growth projections	
Energy objectives/policies in city plan	
Locate new development to minimize energy use	
Integrated land use/transportation planning	
Plan to facilitate district heating, cogeneration	
Energy consideration in timing of key services	
Energy consideration in capital budgeting	
Study community vulnerability	
Emergency preparedness plan	

### COMMUNITY-DIRECTED MEASURES: Development Controls and Other Regulations

Policy	Adopted	Not Adopted
Remove barriers in development controls	10	10
Energy-efficient development standards	10	10
Orient lots and buildings to the sun	1	19
Protect solar access	10	10
Landscaping requirements	2	18
Energy consideration in informal dev. review	1	19
Encourage large energy-efficient development	2	18
Voluntary guidelines	4	16
Incentives to developers	3	17
Visual guidelines for solar systems	2	18
Minimum standards for existing buildings	4	16

**COMMUNITY-DIRECTED MEASURES:** Outreach Programs

[illegible]

**COMMUNITY-DIRECTED MEASURES:** Protecting/Exploiting Local Energy Resources

[illegible]

### 3- In Conclusion

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Appropriately, the best summary of municipal energy-conserving activities comes from the communities themselves. Table 3 on the previous pages draws on a survey of twenty large Canadian municipalities to highlight what is being done, and what is being considered, across the country. Far from complete, this list nevertheless pinpoints measures that are common at this time and suggests, from activities now being considered, future directions for municipal conservation activities in Canada.

One municipality, Vancouver, sums up its experience this way:\*

1. Start with a plan, and revise it as often as necessary. Vancouver has had three to date, serving as a focus for expanding community involvement.
2. Learn from other cities, but don't borrow without carefully adapting the idea or technique. Each program must be built up locally if it is going to win real support.
3. Good management is energy conserving (i.e. municipal options for fuel substitution, vehicle rerouting, downtown parking policy).
4. Start with measures providing obvious payoffs, and document the experience. Easy to support politically and administratively, these projects will win credibility for the committee which will itself be gaining expertise through their practical application.
5. If you aren't sure of a specific project, then experiment. Two major demonstration projects undertaken by Vancouver, Turn Down Traffic Volume (staggered hours and car pools) and the Solar West housing development in the Champlain Heights subdivision (market test for energy-conserving housing) have provided valuable experience and information which will make widespread introduction of such techniques easier when a demand develops.
6. First involve those people who are interested, then those who are affected. Solicit the involvement of both individuals and organizations as the program expands to include the community at large, through informal association and active invitation where necessary.
7. Progress takes money. Staff with time to concentrate on conservation activities is essential. So are funds to support those activities. In internal operations initial energy savings will be gained with very little expense, but beyond the point where obvious waste is eliminated the municipality will have to invest, often substantially, to realize its potential for reducing consumption.

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\* T. Droettboom for the City of Vancouver, Toronto Cities Conference, January 31, 1980.









